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(58) Field of search
UK CL (Edition J) A3V V1A5C V1A5X V1B2B, A4G
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(54) Insulating jacket

(57) A thermally insulating jacket such as a sleeping bag is provided with an inner layer 1 and an outer layer 2 to which are attached a plurality of internal walls 3 so as to define a plurality of boxes. The boxes are filled with insulating material such as down or synthetic material. The inner layer is elasticated by, for example, the provision of elasticated thread (7, Fig.4) which causes the inner layer to pull inwards away from the outer layer. This reduces the space between the inner layer and the person or article being covered by the jacket, so as to reduce heat transfer by convection and also increases the thickness of the jacket, thereby improving its thermal insulation.

In addition to sleeping bags, the invention can be applied to articles of high insulation clothing and also jackets for insulating hot or cold water tanks.

Fig.1.

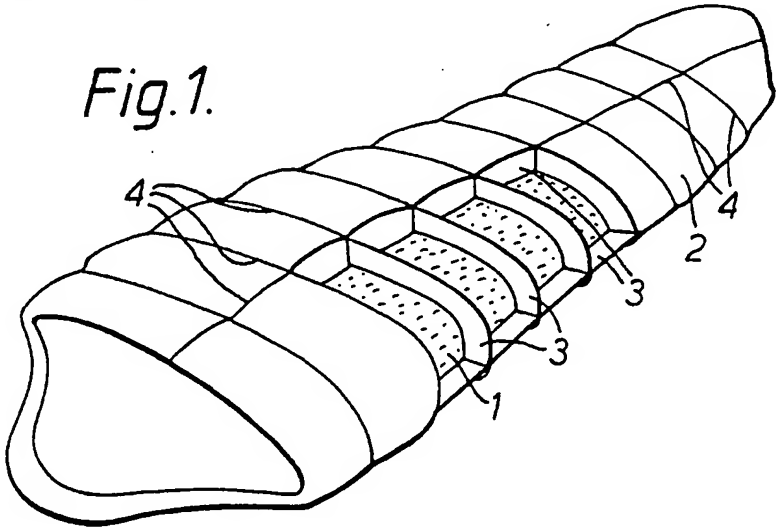

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Fig.1.

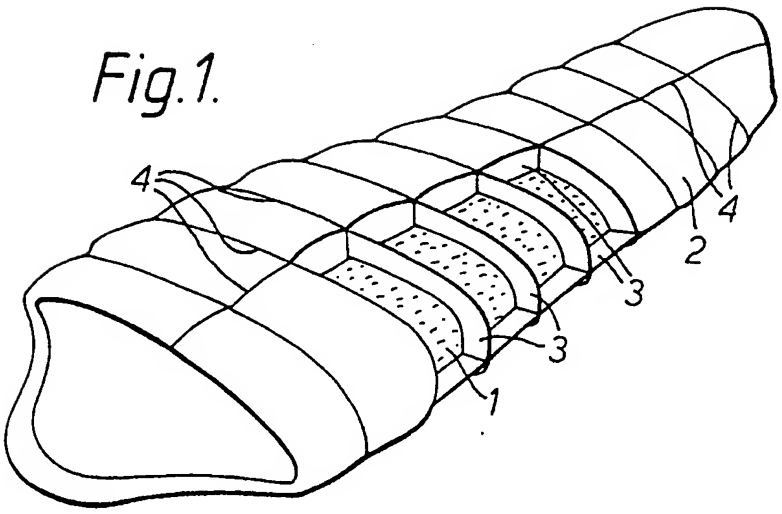


Fig.2A.

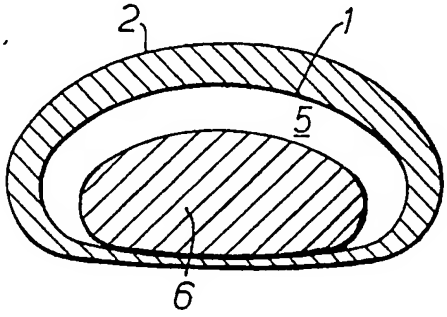


Fig.2B.

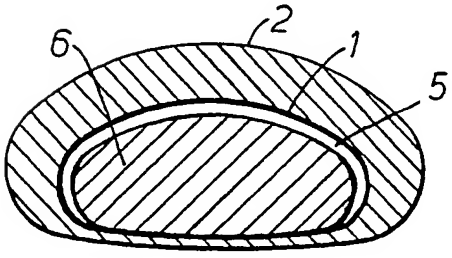


Fig. 3A.

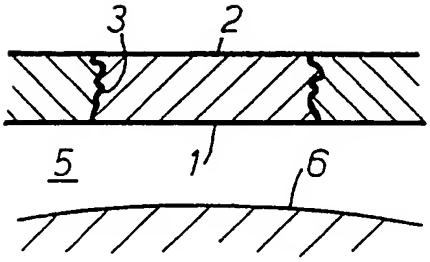


Fig. 3B.

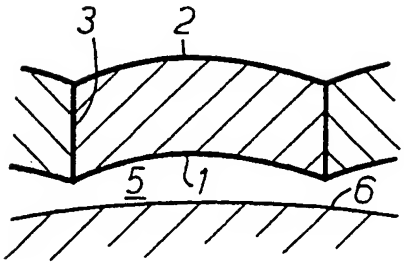
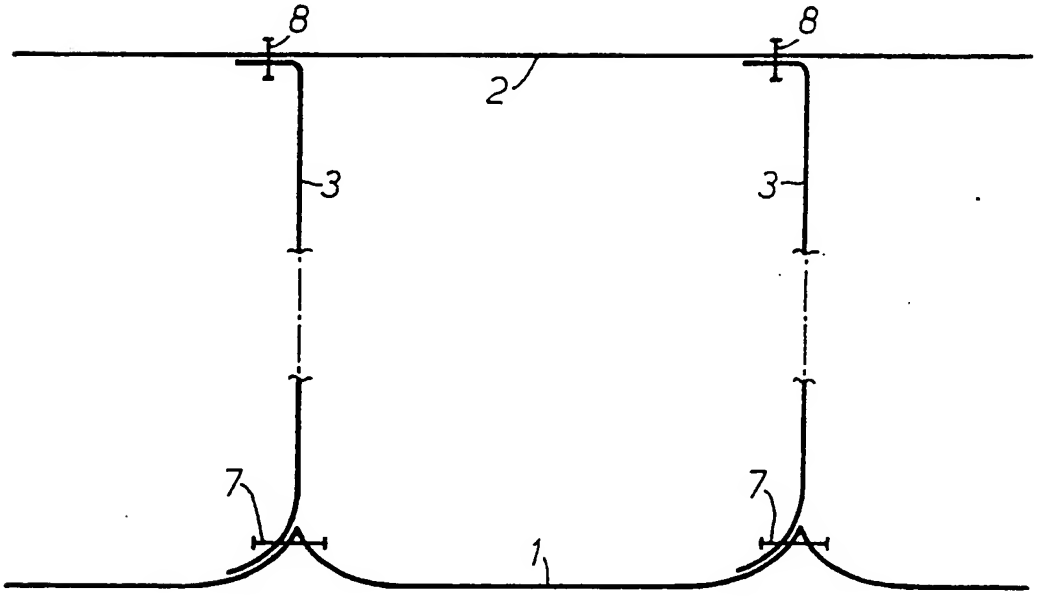


Fig. 4.



INSULATING JACKET

The present invention relates generally to thermally insulating jackets and is particularly concerned with jackets in the form of sleeping bags. However, the invention is also applicable to jackets used as articles of clothing such as anoraks, insulated suits and headgear, and even to jackets in the form of coverings for hot or cold water tanks.

Known thermally insulating jackets comprise an inner layer and an outer layer between which is disposed a mass of thermally insulating material. One problem that arises with such insulating jackets is that the jackets have to be fabricated in a number of different sizes so as to fit, in the case of sleeping bags and clothing, the human being for which they are designed, and, in the case of water tank coverings, the particular water tank for which the jacket is designed.

Furthermore, in the case of sleeping bags, there must be sufficient room for the person to be able to move around. A sleeping bag that is too small has the disadvantage of constricting movement of the person, and one that is too large has the disadvantage of allowing convection currents in the space which have

the effect of increasing body heat loss.

The present applicants have tested a range of conventional sleeping bags and have measured the effective internal circumference of each bag to be, when averaged over its length, about 42% greater than the average circumference of a human being of a size appropriate to the sleeping bag. The effective cross-sectional area within the sleeping bag, being a quadratic function of the circumference, is thus about twice that taken up by the body, resulting in undesirable convection currents as mentioned above.

It would be possible to mitigate the above problem by making the bag a tighter fit, but, as mentioned above, that would make the bag feel excessively constrictive and also require a greater variety of bag sizes.

Furthermore, conventional sleeping bags require a certain time for the insulating material to return to its normal thickness after unpacking the sleeping bag from a compressed state, and, during this time, the insulating effect of the bag is less than its optimum value, since less air can be trapped in the compressed insulating material.

It would therefore be desirable to provide a thermally insulating jacket which overcomes or at least mitigates the above-mentioned disadvantages of

conventional insulating jackets.

Accordingly, the invention in a first aspect provides a thermally insulating jacket having an inner and an outer surface, wherein said inner surface is elasticated.

Preferably, the outer surface is elasticated to a lesser degree than the inner surface, or is not elasticated at all.

Preferably, the arrangement is such that the elastication of the inner surface tends to cause an increase in the separation between the inner and outer surfaces.

The above arrangement has the advantage that the effective area presented by the inner surface in use is reduced, as compared with that in the absence of elastication, to an extent depending on the size of the person or articles surrounded by the jacket, thereby reducing the air space in which convection currents can occur, and this in turn reduces heat transfer between the person or articles and the surrounding atmosphere. Also, by not elasticating the outer surface, or elasticating it to a lesser degree, the inner surface is enabled to pull inwards away from the outer layer, thus increasing the thickness of the jacket in use. Furthermore, if such a jacket is adapted to be packed in a compressed state, the

elastication of the inner layer, in conjunction with the outer layer not being elasticated, causes the inner surface to pull inwards away from the outer surface, thus reducing the possibility of cold spots forming where the layers touch each other and enabling the desired thickness of the jacket to be attained more rapidly than in conventional insulating jackets.

Another advantage particularly valuable in sleeping bags, and to some extent in articles of clothing, is that the wearer can have a tightly fitting garment without feeling constricted, because only the inner surface is elasticated. It will be appreciated that if the entire jacket were elasticated throughout its thickness, substantial elastic force would be necessary to ensure a tight fitting, resulting in substantial perceived constriction by the wearer.

A further advantage of particular value in clothing is that the "bellows effect", whereby a large percentage of the insulating value can be lost by warm air being forced from inside loose clothing by body movement, can be avoided or substantially reduced.

The inner and outer surfaces would normally be surfaces of respective inner and outer layers. Alternatively, the jacket may comprise a single layer of material which preferably is of a thickness which

is non-resiliently expansible, and in this case the inner and outer surfaces would be respective surfaces of the single layer.

In a second aspect, the invention provides a thermally insulating jacket comprising:

(a) an inner layer and an outer layer;

(b) a plurality of internal walls each attached at one edge thereof to said inner layer and at another edge thereof to said outer layer so as to define in conjunction with said inner and outer layers a plurality of boxes; and

(c) a mass of thermally insulating material disposed in each of said boxes;

wherein said inner layer is elasticated.

It is appreciated that all threads are elastic to a small extent. However, the term "elasticated" as used in the present application is intended to mean that the resulting linear dimension of the inner surface or inner layer is caused to be reduced by a significant extent, and preferably by at least by 10% from its normal, unelasticated value. Indeed, a degree of elastication such as to cause a reduction in linear dimension of in excess of 15% from the normal, unelasticated value is especially preferred.

The jacket is preferably elongate and the inner

layer preferably elasticated in a transverse direction and not elasticated along the longitudinal direction. This arrangement causes the jacket to be wrapped more efficiently about a person or elongate article.

The means of attachment is preferably not exposed on either the inner layer or the outer layer, and this is preferably achieved using tuck stitching. The elastication of the inner layer is preferably by means of elasticated thread which constitutes the means of attachment of the internal walls to the inner layer. This provides a means of elasticating the inner layer which is simple to effect in manufacture and, in the case of an insulating jacket which would be conventionally manufactured by attaching the internal walls to the inner layer by means of non-elasticated thread, this has the advantage that a jacket according to the second aspect of the present invention can be manufactured simply by replacing the non-elasticated thread with elasticated.

The outer layer is preferably attached to the internal walls by means of non-elasticated thread.

Although the invention may of course provide a jacket made from any suitable thermally insulating material, whether natural or synthetic, the preferred material is down or other free-moving insulation, since this material more readily moves to fill the

spaces within the boxes, thereby minimising relatively cold (or hot) spots caused by convective heat transfer through air gaps next to the internal walls.

The thermally insulating jacket may be in the form of a sleeping bag, an article of clothing or a jacket adapted to fit around a water tank.

An embodiment of the present invention will now be described in detail with reference to the accompanying drawings, wherein:

Figure 1 is a pictorial representation, partially cut away, of a known sleeping bag;

Figures 2A and 2B are respectively diagrammatic representations, in transverse cross-section, of a known sleeping bag and a sleeping bag incorporating an elasticated thread in accordance with an embodiment of the present invention;

Figures 3A and 3B are similar to Figures 2A and 2B, but show diagrammatically longitudinal cross-sections of the bags; and

Figure 4 shows in diagrammatic form the stitching used to attach the internal walls to the inner and outer layers of the sleeping bag shown in Figures 2B and 3B.

Figure 1 shows a sleeping bag having an inner layer 1 and an outer layer 2 which are joined by internal baffles or walls 3. The walls shown extend

longitudinally along the sleeping bag, and transversely across the bag. The lines 4 indicate stitching joining the walls 3 to the outer layer 2. The inner layer 1, the outer layer 2 and the internal walls 3 define boxes in which is disposed suitable insulating material such as down or a synthetic material.

Figures 2A and 3A show diagrammatically the configurations adopted by the sleeping bag in use. It will be noted that there is a large volume 5 of air between a body 6 in the sleeping bag and the inner layer 1. Figures 2B and 3B are similar views, but illustrate the configuration of a sleeping bag in accordance with the present invention, having an elasticated inner layer 1. It will be noted that there is a much smaller volume 5 of air between the body 6 and the inner layer 1, and the thickness of the sleeping bag, i.e. the distance between the inner and outer layers 1 and 2, has increased substantially to the extent that the walls 3 are fully extended.

As shown in Figure 4, the elastication of the inner layer 1 is achieved by incorporating elasticated thread 7 sewn along the junction of the inner layer 1 and the transversely extending internal walls 3, thereby attaching the inner layer to the walls. The elasticated thread 7 would normally be hidden below

the surface of the inner layer 1 so as to prevent it catching and thereby breaking. This is achieved by attaching the internal walls 3 to the inner layer 1 using tuck stitching of the elasticated thread, as shown diagrammatically in Figure 4. The outer layer 2 is attached to the internal walls 3 by means of non-elasticated thread 8.

Although in the preferred embodiment it is the junctions of transversely extending internal walls 3 and the inner layer 1 which are provided with the elasticated thread, of course it is also or alternatively possible to provide the junctions of any longitudinally extending internal walls and the inner layer with such thread.

The degree of elastication of the inner layer is dependent both on the intrinsic properties of the elastic thread and also on the tension which is applied to it when the thread is sewn. The type of elastic thread in normal use is known as shearing elastic. The present applicants have found that a desirable degree of elastication is such as to cause a reduction in the width of the sleeping bag of about 16% from its normal, "unelasticated" value, and this causes a corresponding reduction in the excess circumference referred to above from about 42% to about 19% without causing any noticeable discomfort to

the person in the sleeping bag. The figure of 19% is equivalent to a cross-sectional area of about 40% in excess of that taken up by the body, compared with the 100% excess in conventional sleeping bags. The applicants have also found that the resulting thickness of the sleeping bag is increased by about 15 to 20% as a result of elastication of the inner layer, giving rise to a significant increase in thermal insulation.

Although in the embodiment described the means of elastication of the inner layer is by elasticated thread, any other suitable means of elastication, such as for example the attachment of elasticated tape to the inner layer or surface or indeed the inner layer being fabricated from elasticated material would be possible. In addition the inner and outer layers may be attached to the internal walls by any suitable means, and the means may be different for the inner and outer layers. Such means may for example include adhesives or press-stud fasteners.

In an alternative arrangement, the degree of elastication of the inner layer can be varied by the user. Thus, for example, an otherwise conventional sleeping bag may be provided on its inside with an elasticated cord which is attached to the inner layer by a sheath of material which extends substantially

all the way around the inner circumference of the bag and extends inwardly away from the inner layer, or possibly by a plurality of discrete loops of material. The cord may either be continuous or have ends which can be fastened together, or held together by a clip. The user would be able to pull either the ends of the cord or a portion of the cord so as to tension it to a desired degree, and would then knot or clip the cord in order to maintain the tension. Several such cords could be provided, spaced longitudinally along the sleeping bag.

The invention has been described above in connection with its application to sleeping bags of a conventional form including boxes defined by longitudinally and transversely extending inner walls. It will of course be appreciated that the invention can also be applied to other forms of sleeping bags which omit one or more or all of these inner walls.

Although the present invention has been described with respect to sleeping bags, it can apply equally well to clothing requiring a high level of thermal insulation and also jackets for insulating either hot or cold water tanks. The invention can equally well be applied to coverings for use in hospitals for treating victims of hypothermia.

CLAIMS:

1. A thermally insulating jacket having an inner and an outer surface wherein said inner surface is elasticated and said outer surface is elasticated to a lesser degree than the inner surface, or is not elasticated at all.

2. A thermally insulating jacket having an inner and an outer surface, wherein said inner surface is elasticated, the arrangement being such that the elastication of the inner surface tends to cause an increase in the separation between the inner and outer surfaces.

3. A thermally insulating jacket as claimed in claim 1 or claim 2 wherein said inner and outer surfaces are surfaces of respective inner and outer layers of said jacket.

4. A thermally insulating jacket comprising:

(a) an inner layer and an outer layer;

(b) a plurality of internal walls each attached at one edge thereof to said inner layer and at another edge thereof to said outer layer so as to define in conjunction with said

inner and outer layers a plurality of boxes; and

(c) a mass of thermally insulating material disposed in each of said boxes;

wherein said inner layer is elasticated.

5. A thermally insulating jacket according to claim 4 wherein the means of attachment is not exposed on either the inner layer or the outer layer.

6. A thermally insulating jacket according to claim 5, wherein the means of attachment is tuck stitching.

7. A thermally insulating jacket according to any one of claims 4 to 6, wherein the elastication of said inner layer is by means of elasticated thread constituting a means of attachment of said internal walls to said inner layer.

8. A thermally insulating jacket according to any one of claims 4 to 7, wherein said outer layer is attached to said internal walls by means of non-elasticated thread.

9. A thermally insulating jacket according to

any one of claims 4 to 8 wherein said thermally insulating material is down.

10. A thermally insulating jacket as claimed in any one of claims 3 to 9 wherein said outer layer is not elasticated.

11. A thermally insulating jacket as claimed in any one of claims 3 to 10 which is generally elongate and wherein said inner layer is elasticated in a transverse direction and not elasticated along the longitudinal direction.

12. A thermally insulating jacket as claimed in any one of claims 3 to 11 wherein the degree of elastication of the inner layer is such as to cause a reduction in linear dimension of in excess of 15% from the normal, unelasticated values.

13. A thermally insulating jacket as claimed in any one of claims 3 to 12 wherein the degree of elastication of the inner layer is variable by the user.

14. A thermally insulating jacket according to any one of claims 1 to 13 wherein said jacket is a

sleeping bag.

15. A thermally insulating jacket according to any one of claims 1 to 13 wherein said jacket is an article of clothing.

16. A thermally insulating jacket according to any one of claims 1 to 13 wherein said jacket is adapted to fit around a water tank.

17. A thermally insulating jacket substantially as described herein with reference to Figures 2B, 3B and 4 of the accompanying drawings.

18. A thermally insulating jacket having an inner and an outer surface, wherein said inner surface is elasticated.

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